

# **WORKFORCE NEEDS FOR LARGE-SCALE SOLAR PROJECTS**



**PRESENTED AT  
LARGE-SCALE SOLAR PROJECT WORKFORCE NEEDS WORKSHOP  
California Environmental Protection Agency**

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Center for Energy Efficiency & Renewable Technologies**

# WHY IS SOUTHERN CALIFORNIA THE SOLAR MECCA?



**Best solar “fuel” in the Western Hemisphere**

**Home to large electric demand loads:  
*Power Hungry Cities***

**Most solar projects in Kern, Riverside, San Bernardino and Imperial Counties**

**Permitting challenges must be overcome to get projects built:**  
Multi-Agency Permitting, Competing Land Use, Transmission Needs,  
Habitat Protection, Local Government Entitlements and Fees



# Over 7,700 MW of Solar Projects Prioritized in Southern California

**Power Tower**



**Stirling Engine**



**Photovoltaic**



**Parabolic Trough**



# KEY SOLAR PROJECTS 2010-2011

(PRIORITIZED PERMITTING BY LOCAL, STATE AND/OR FEDERAL AGENCIES)

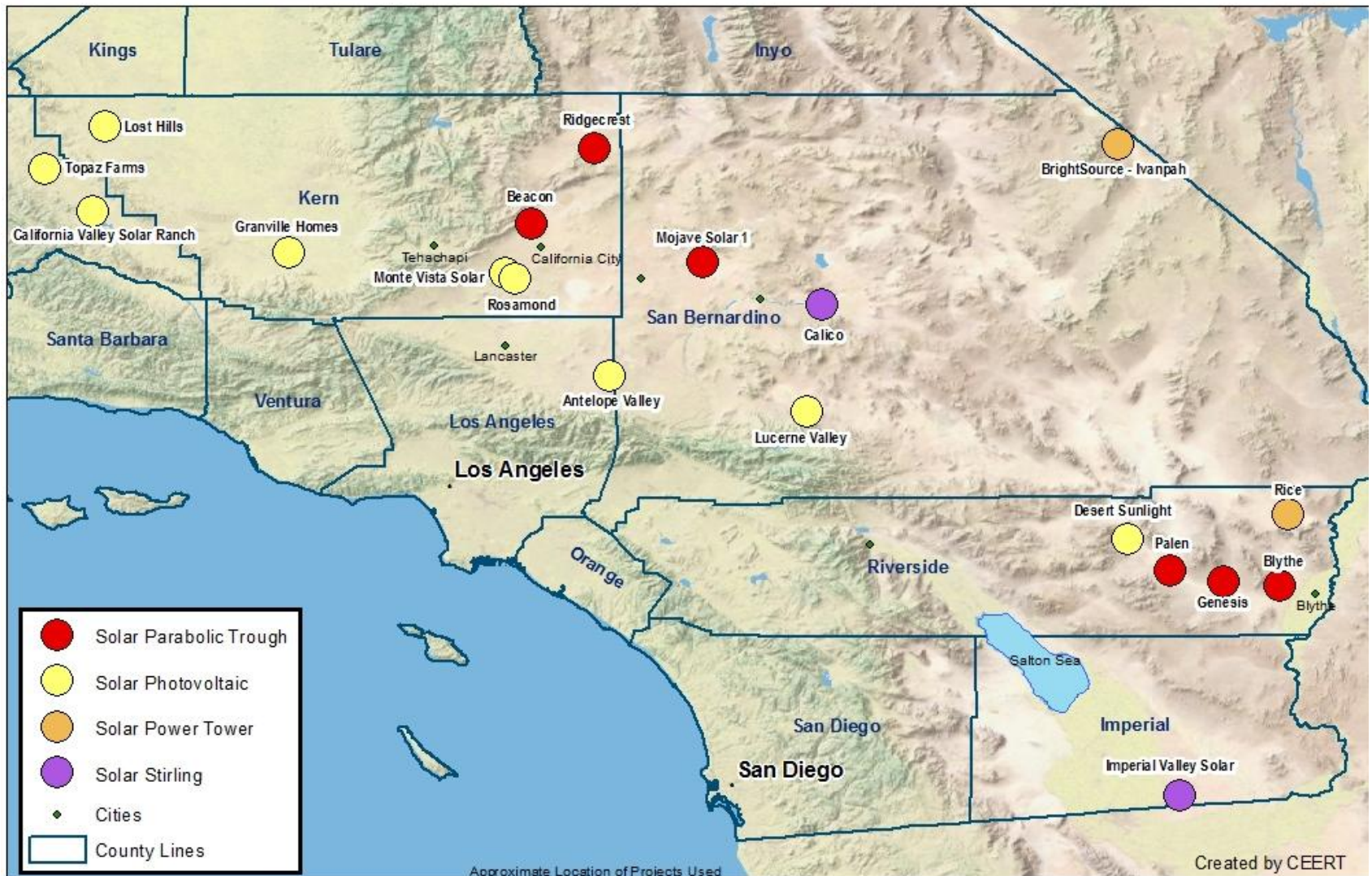
## 7,737 MW CAPACITY

TECHNOLOGY	DEVELOPER	PROJECT NAME	LOCATION	MW SIZE
<b>PHOTOVOLTAICS</b>	Chevron	Lucerne	Barstow , Kern	45
	First Solar	Topaz Solar Farm	California Valley, San Luis Obispo	550
	First Solar	Monte Vista Solar	Mojave , Kern	126
	First Solar	Desert Sunlight	Desert Center, Riverside	550
	Granville Homes	Maricopa Sun Solar Project	Kern County	700
	NextLight	Antelope Valley	Antelope Valley , East LA County	230
	NextLight	Lost Hills	Lost Hills, Kern	307
	Sempra Generation	Rosamond Solar Project	Rosamond, Kern	120
	SunPower	California Valley Solar Ranch	California Valley, San Luis Obispo County	250
<b>POWER TOWER</b>				
	SolarReserve	Rice	Blythe, Riverside	150
	BrightSource	Ivanpah	Needles, San Bernardino	400
<b>PARABOLIC TROUGH</b>				
	NextEra	Beacon	California City, San Bernardino County	250
	NextEra	Genesis	Blythe, San Bernardino County	250
	Abengoa	Mojave Solar Project	Harper Dry Lake, Kern	250
	Solar Millennium	Ridgecrest	Ridgecrest, Kern	500
	Solar Millennium	Blythe	Blythe, Riverside County	1000
<b>STIRLING ENGINE</b>				
	Teserra Solar	Calico	Barstow, San Bernardino County	850
	Teserra Solar	Imperial Valley Solar	Southern Imperial County	709

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## 19 Key Solar Projects 2010-2011

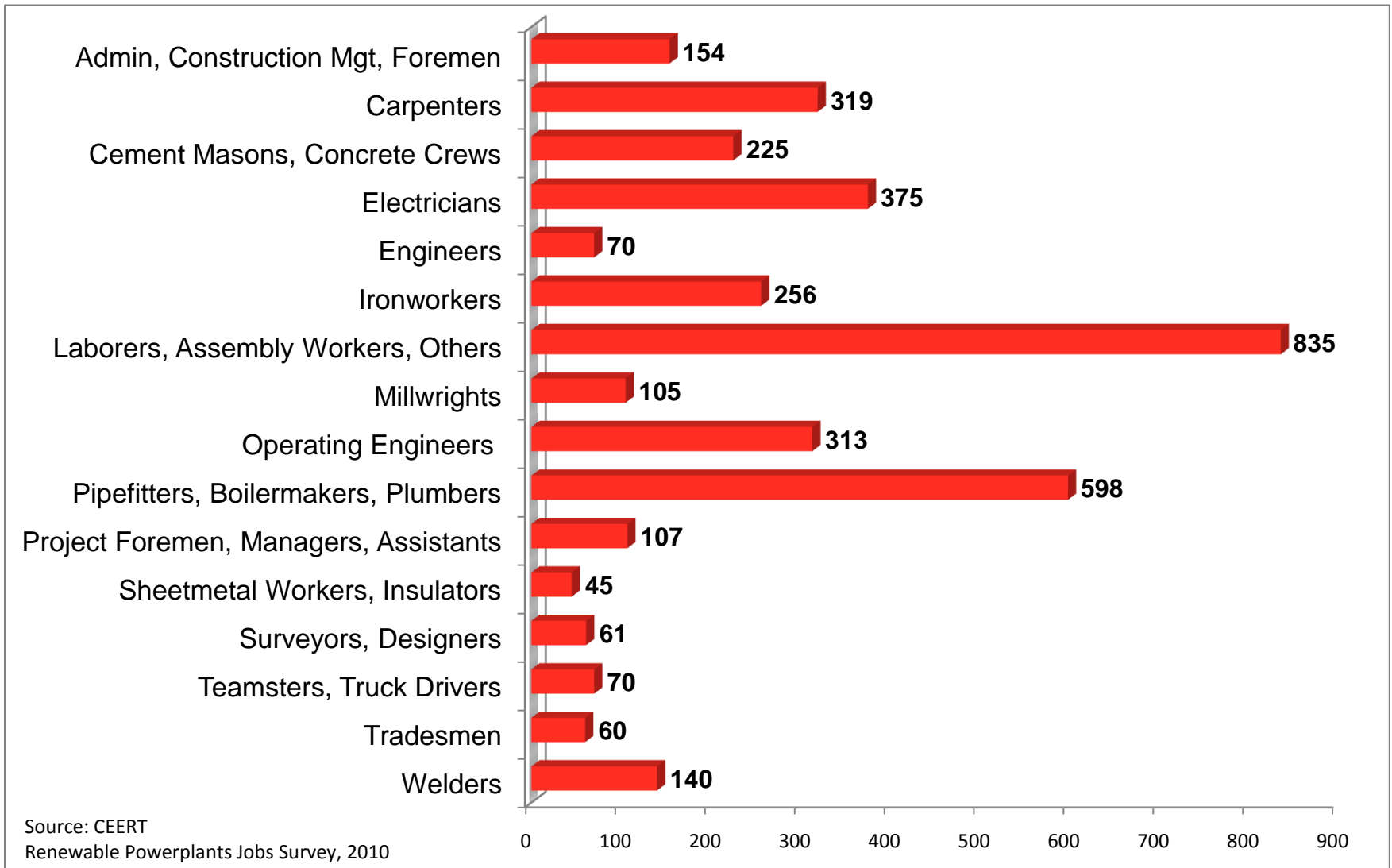
# WE SURVEYED LARGE SOLAR DEVELOPERS TO UNDERSTAND THEIR WORKFORCE NEEDS

	TECHNOLOGY	PROJECT NAME	MW SIZE	AVG # JOBS	EMPLOYMENT LENGTH
				FTEs PER MONTH	
<b>ABENGOA</b>	Parabolic Trough	Mojave Solar 1 Project	250	830	2 Years
<b>SOLAR MILLENNIUM</b>	Parabolic Trough	Blythe Solar Power Plant	1,000	604	5.5 Years
<b>SOLAR MILLENNIUM</b>	Parabolic Trough	Palen Solar Power Plant	500	566	3.5 Years
<b>SOLAR MILLENNIUM</b>	Parabolic Trough	Ridgecrest Solar Power Plant	250	405	2.5 years
<b>NEXTERA</b>	Parabolic Trough	Beacon Solar Energy Project	250	507	3.5 years
<b>NEXTERA</b>	Parabolic Trough	Genesis Solar Energy Project	250	507	2.5 Years
<b>TESSERA</b>	Stirling Engine	Imperial Valley Solar	709	360	3.5 years
<b>PERMACITY</b>	Photovoltaics	Five 3-5 MW Commercial Roof Systems	25	500	.5 year
<b>SUNPOWER</b>	Photovoltaics	California Valley Solar Ranch	250	353	~3 Years
<b>TOTAL</b>			<b>3,484 MW</b>	<b>4,632 JOBS/MONTH COMBINED</b>	<b>~3 YEARS</b>

The survey is a sample, not a census, of all the projects being developed. Prepared by Center for Energy Efficiency & Renewable Technologies



# Monthly Construction Jobs Estimates From 7 Solar Thermal Projects: ~3,500 MW Length of Construction: 2.5 – 6 Years



# CONSTRUCTION WORKFORCE NEEDS

## 1,000 MW PARABOLIC TROUGH PROJECT

Construction Period: ~6 Years

Job Description	AVERAGE Monthly Workforce (FTEs)	PEAK Monthly Workforce (FTEs)
Administrators and Support Personnel	11	14
Carpenters	57	90
Cement Masons and Concrete Crews	59	95
Construction Management, Supervisors, Planners	2	3
Electricians	58	81
Engineers	7	8
Ironworkers	24	50
Laborers, Assembly Workers, Misc. Crews	106	271
Millwrights	14	18
Operators	57	152
Pipefitters, Boilermakers, Plumbers	136	299
Project Foremen, Managers and Assistants	2	3
Surveyors and Designers	8	20
Teamsters, Truck Drivers	18	43
Other Skilled Tradesmen	12	66
Welders	1	1
Others (Oilers, Security, Sprinklerfitters, Tech Advisors)	5	10
<b>TOTAL</b>	<b>577</b>	<b>1004</b>

Source: CEERT Renewable Powerplants Jobs Survey, 2010



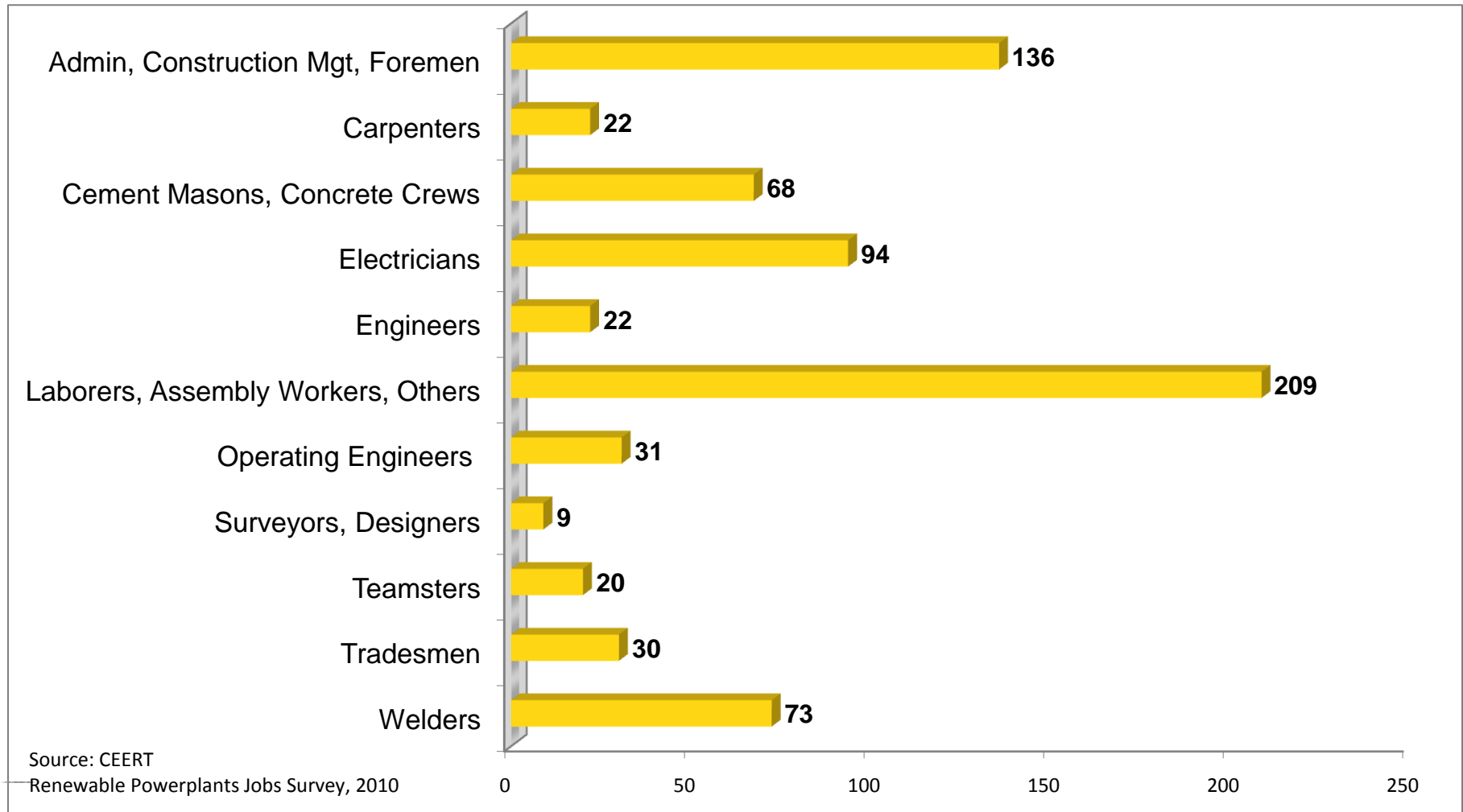


# OPERATION AND MAINTENANCE JOBS 250 MW SOLAR THERMAL POWERPLANT



Job Description	Annual Workforce	Salary (Average)
<b>General:</b> Office Personnel, Administration, Managers	10	\$ 126,500
<b>Engineering:</b> Controls, Electrical, Mechanical, Plant and Resource Engineers, Project Analyst, Chemical Technician, Engineering Technician, Operations Supervisors	6	\$ 117,500
<b>Maintenance:</b> Mechanical Technicians, Electricians, Equipment Operators, Welders, Machinists, Planners, Equipment Washing Technicians, Auto Mechanics	25	\$ 87,800
<b>Operations:</b> Shift Supervisor, Control Operator, Plant Operator, etc.	22	\$ 91,100
<b>Unskilled Labor</b>	5	\$ 25,000
<b>TOTAL</b>	<b>68</b>	<b>\$ 92,600</b>

# Monthly Construction Jobs Estimates From 2 Solar PV Projects: 275 MW Length of Construction: 0.5 – 3 Years



# CONSTRUCTION WORKFORCE NEEDS

## 250 MW PHOTOVOLTAIC SYSTEM

Construction Period Length: ~3 Years

Job Description Average	AVERAGE Monthly Workforce (FTEs)	PEAK Monthly Workforce (FTEs)
Administrators	2	4
Carpenters	12	15
Cement Masons	10	20
Construction Staff	3	6
Electricians	25	50
Engineers	2	2
Laborers	10	20
Operating Engineers	7	15
Operators	5	10
Project and Construction Managers	7	10
Solar Field Craft: Incl's Apprentices, Assistants and Helpers	90	133
Surveyors	4	8
Teamsters	20	30
Welders	15	30
<b>TOTAL</b>	<b>212</b>	<b>353</b>

Source: CEERT Renewable Powerplants Jobs Survey, 2010



## UNEMPLOYMENT RATES REMAIN HIGH IN SOLAR PROJECT COUNTIES

<b>Imperial</b>	<b>31.30%</b>
<b>Kern</b>	<b>14.40%</b>
<b>Los Angeles</b>	<b>12.50%</b>
<b>Riverside</b>	<b>15.30%</b>
<b>San Bernardino</b>	<b>14.80%</b>
<b>San Luis Obispo</b>	<b>9.70%</b>
Source: July 2010 Statistics CA EDD, Labor Market Information Division	





# COUNTY SNAPSHOTS

July 2009-July 2010

## IMPERIAL

**Construction  
Job Losses  
2009-2010**

Jobs lost: **↓ 200**  
09-10 Change: **-14.3%**

**Utility, Transportation  
Job Losses  
2009-2010**

Jobs lost: **↓ 400**  
09-10 change: **-3.9%**

**Construction/Utility  
Jobs Gains  
From 7 Solar Projects**

**360 Jobs**  
**3.5 Years**

## KERN

Jobs lost: **↓ 1,600**  
09-10 change: **-12.6%**

Jobs lost: **↓ 100**  
09-10 change: **-0.2%**

**1,287 Jobs**  
**2.5 – 4 Years**

## LOS ANGELES

Jobs lost: **↓ 13,400**  
09-10 change: **-11.7%**

Jobs lost: **↓ 7,300**  
09-10 change: **-1%**

**200 Jobs**  
**0.5 Year**

## RIVERSIDE SAN BERNARDINO

Jobs lost: **↓ 10,000**  
09-10 change: **-14.7%**

Jobs lost: **↓ 3,300**  
09-10 change: **-1.2%**

**2,528 Jobs**  
**3.5 – 6 Years**

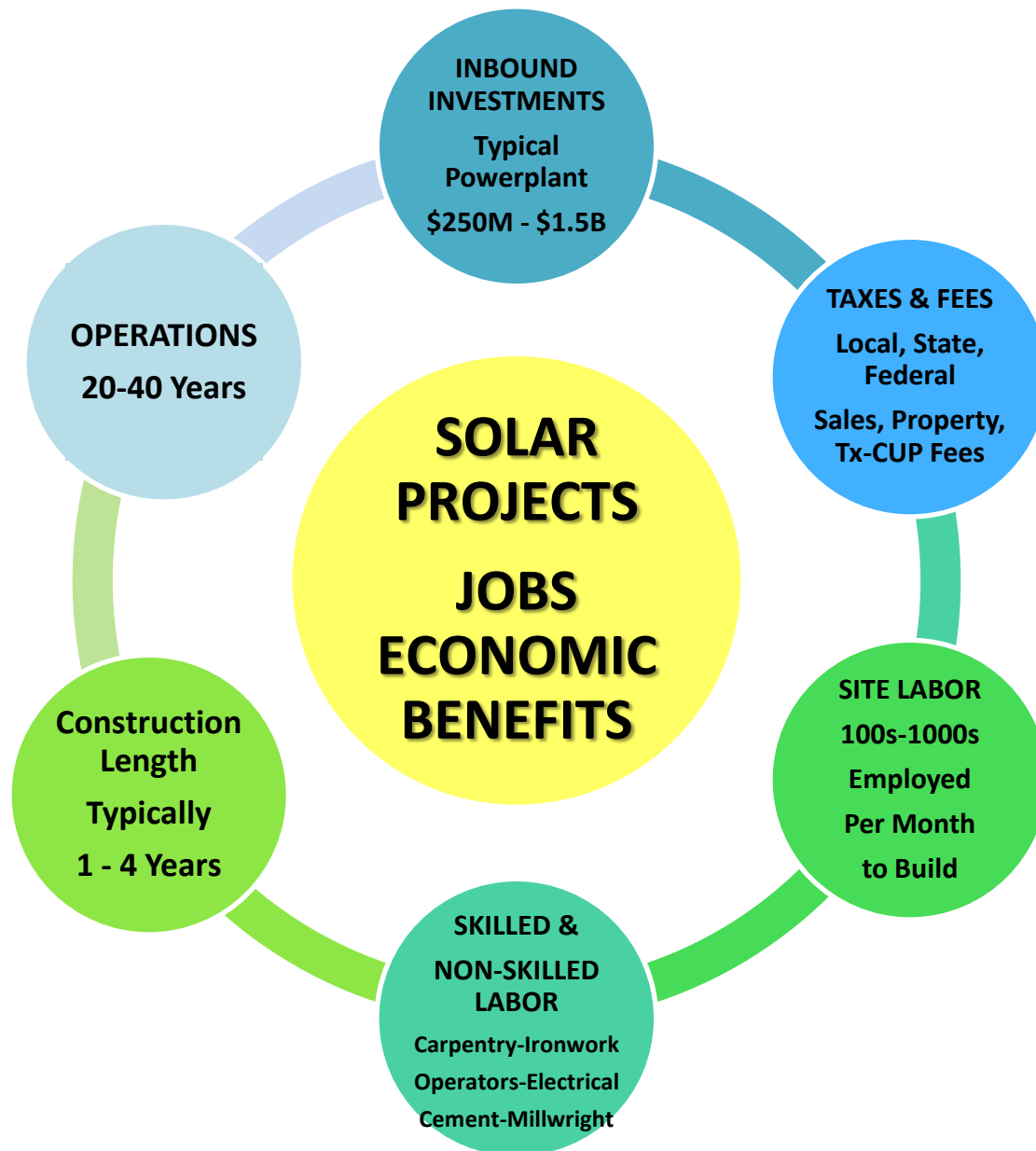
## SAN LUIS OBISPO

Jobs lost: **↓ 700**  
09-10 change: **-13.7%**

Jobs lost: **↓ 500**  
09-10 change: **-2.7%**

**212 Jobs**  
**3.5 Years**





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